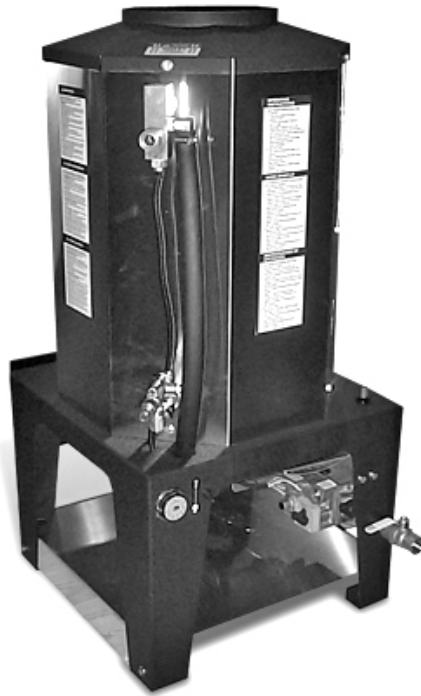


RAMTEQ®

QUALITY PRESSURE WASHERS



OPERATOR'S MANUAL

Model HBV400-04
Vertical Hotbox - NG/LP fired

READ THIS MANUAL

This manual contains important information for the use and safe operation of your RAMTEQ® machine. **FAILURE TO READ THIS MANUAL AND FOLLOW ITS INSTRUCTIONS PRIOR TO OPERATING OR ATTEMPTING ANY SERVICE OR MAINTENANCE PROCEDURE COULD RESULT IN SERIOUS INJURY OR DEATH TO YOU OR OTHER PERSONS; ALSO DAMAGE TO THE MACHINE OR TO OTHER PROPERTY.**



Table of Contents

SECTION 1 OPERATOR'S MANUAL

■ UNPACKING.....	2
■ SAFETY GUIDELINES.....	3
■ INSTALLATION INSTRUCTIONS.....	4
■ OPERATING INSTRUCTIONS.....	5

SECTION 2 PARTS AND SERVICE MANUAL

■ MAINTENANCE INSTRUCTIONS.....	6
■ TROUBLESHOOTING.....	6
■ EXPLODED VIEW & PARTS LIST.....	7
■ BURNER, PLUMBING & PARTS LIST.....	8
■ PLUMBING DIAGRAM & PARTS LIST.....	9
■ WIRING DIAGRAM.....	10
■ WARRANTY.....	11

Unpacking Instructions

INSPECTION

Carefully unpack your new RAMTEQ hotbox by removing the banding and cardboard box from pallet. Remove the pressure washer from the pallet and check for any physical damages that may have occurred during shipment. Check for all parts specified and shown in figure 1.



Figure 1

NOTICE

Information in this operator's manual is subject to change without notice.

RAMTEQ SHALL NOT BE LIABLE FOR TECHNICAL OR EDITORIAL ERRORS OR OMISSIONS CONTAINED HEREIN. This operator's manual contains information protected by copyright. No part of this operator's manual may be photocopied or reproduced in any form without prior written consent from RAMTEQ®.

© RAMTEQ®, 2005
All rights reserved. Printed in USA.



Safety Guidelines



READ THIS FIRST! FAILURE TO READ AND OBSERVE ALL WARNING STATEMENTS COULD RESULT IN SEVERE BODILY INJURY OR DEATH, POSSIBLE INJURY TO OTHER PERSONS, DAMAGE TO MACHINE OR OTHER PROPERTY.

- Do not operate this hotbox in an unstable environment. Hotboxes can cause explosions when operated near flammable materials and vapors. Do not operate machine when thinners, solvents, fuels and combustibles are present.
- Do not store or keep combustible materials on or near this hotbox.
- Do not use any electrical outlet that is not properly grounded or does not comply with all federal, state, and local laws or electrical codes.
- Do not operate while under the influence of alcohol, drugs, or while fatigued.
- Do not operate this hotbox without wearing protective eye wear.
- Do not operate or store this hotbox in areas not properly ventilated.
- Do not operate around unsupervised children.
- Do not operate this hotbox in an unsafe manner.
- Do not service this hotbox without disconnecting power supply.
- Do not alter original factory settings prior to operating this hotbox. Risk of injury to yourself or other persons may occur.
- Do not attempt to service this hotbox before reading the service manual.
- Do not spray caustic acids or abrasive fluids through this hotbox.
- Do not permit lime and scale buildup to occur in the heat exchanger coil.
- Do not permit water to freeze inside this hotbox. Risk of coil and plumbing damage may occur.
- Keep all personnel clear when using this hotbox.
- Use only recommended RAMTEQ® parts when servicing this hotbox.
- RAMTEQ® will not be held liable for any unauthorized modifications made to hotbox.



MAKE SURE ALL SWITCHES ARE IN THE OFF POSITION BEFORE CONNECTING HOTBOX. DO NOT STAND IN WATER WHILE CONNECTING HOTBOX TO POWER SOURCE.



LOCATE THIS HOTBOX IN A WELL VENTILATED AREA AWAY FROM ANY COMBUSTIBLE ITEMS. DO NOT STORE ANY COMBUSTIBLE MATERIALS NEAR HOTBOX WHILE IN USE.



Installation Instructions

LOCATION & INSTALLATION GUIDELINES

- Locate the machine on a solid and level surface so that engine and pump crankcase oil lubricate components properly. Avoid areas where water can build up in the working area. Possible injury can occur caused by the surface becoming slippery from water build up.
- Locate the machine in a well-ventilated area and away from flammable materials or fumes. Be sure ventilation warnings are observed. Keep pressure washer at least 18" away from flammable materials.
- Locate the machine so the operator has easy access to the pressure washer and its controls. Locate the machine so that it is protected from external damage.
- Confer with local gas company, and with proper municipal officials regarding any specific code or regulations governing this installation. Installation must conform with all local codes prior to operation of machine.
- A draft diverter hood must be installed and vented to the outside.
- Check gas union located under burner ring prior to operation. Soap test gas pipe fittings for leaks once pressurized.
- To prevent damage and excessive hose wear, locate the pressure washer so that the hose does not cross traffic areas
- The gas line should be a separate supply direct from the meter to the burner. New pipe is recommended to be used and located so that a minimum amount of work will be required in future servicing. The piping should be so installed as to be durable, substantial and gas tight. It should be clear and free from cutting burrs and defects in structure of threading. Cast iron fittings or aluminum tubing should not be used for the main gas circuit. Joint compounds (pipe dope) should be used sparingly on male threads only and be approved for all gases.
- Venting: A vented draft diverter hood should be used with all indoor installations. Poor draft will cause the machine to soot and not operate efficiently. Positioning of the machine should be in such a manner so that the stack is as straight as possible and have sufficient height to eliminate downdraft.

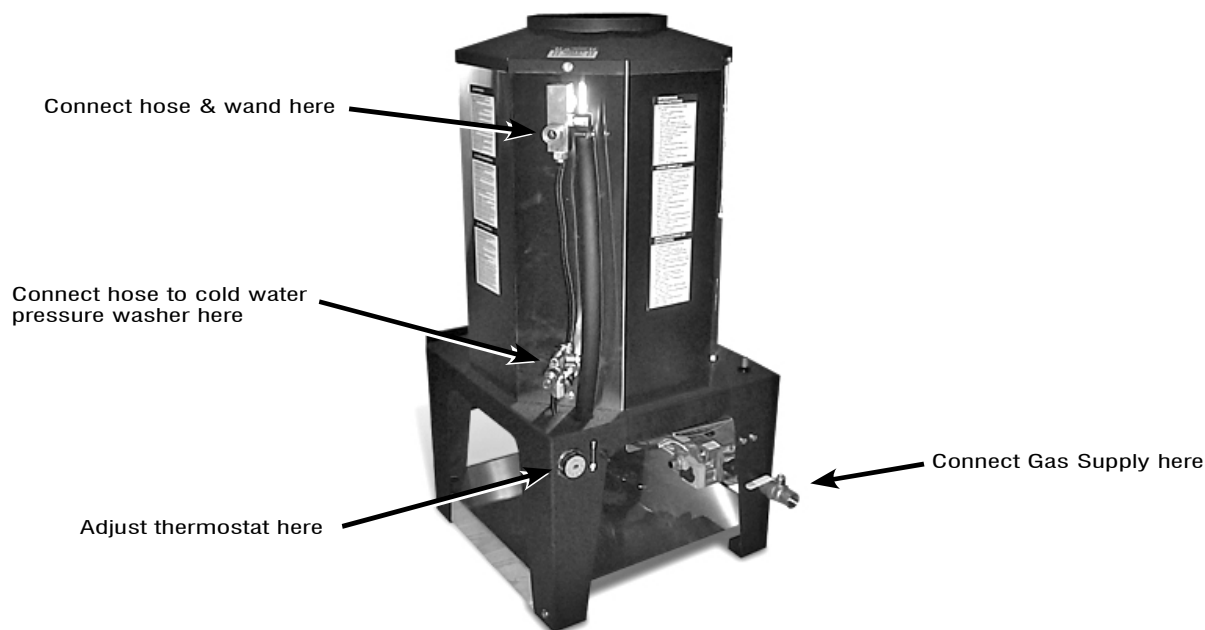
Natural Gas & LP Installation Checklist

Checked

- | | |
|-----------------------------------------------------------------------------------------------------------|-------|
| ■ Has gas supply been inspected by an authorized contractor and meets all local codes? | _____ |
| ■ Is machine protected from downdraft and excessive wind? | _____ |
| ■ Is machine shielded from moisture of water spray? | _____ |
| ■ Is voltage correct and circuit breaker adequate according to specifications and serial plate notations? | _____ |
| ■ Is the machine electrically grounded? | _____ |
| ■ Have all flammable liquids or gases been removed from location? | _____ |
| ■ Is there adequate gas supply for BTU rating of the burner? | _____ |
| ■ Is incoming gas supply pressure between 6" and 14" water column? | _____ |
| ■ Has the proper gas regulator been installed with proper pressure and volume? | _____ |
| ■ Is machine properly vented allowing adequate air flow? | _____ |
| ■ Are the propane tanks large enough to prevent freezing? | _____ |
| ■ Have gas lines been checked for gas leaks? | _____ |



Operating Instructions



CONNECTING AND USING THE HOTBOX

- Read this manual before starting HotBox
- Protective eye wear is advised during operation of the HotBox
- Position HotBox on level surface away from outside influences such as rain, strong winds, open flame, or freezing temperatures
- Check that the HotBox thermostat dial is in the "OFF" position.
- Connect a hose from the pump outlet on the pressure washer to the bottom of the coil on the HotBox.
- Attach hose with wand to top of coil on the HotBox
- Install desired water nozzle at the end of wand, making sure it is clear of any obstructions.
- Start "Cold Water" pressure washer. Open the trigger gun while firmly gripping the wand assembly. Grasp the grip on the wand with one hand and the trigger gun with the other.
- Check for leaks in the system and cycle trigger gun to insure bypass is adjusted correctly. Repair any leaks and correct unloader adjustment if needed.
- Turn Thermostat dial to desired setting on HotBox. Check for burner ignition. Do not touch HOT surfaces.
- Adjust thermostat to a temperature appropriate for best application. Maximum temperature setting may not be needed to accomplish the task.

WHEN FINISHED USING THE HOTBOX

- Turn Thermostat to the "OFF" position
- Cycle cold water thru coil for a short period of time.
- Turn "Cold Water" pressure washer off
- Disconnect hoses and wand as necessary.



Maintenance Instructions

HEAT EXCHANGER COIL PRECAUTIONS

- High mineral content in water may require a water softener installation.
- Do not permit acidic, caustic or abrasive fluids to be pumped through system.



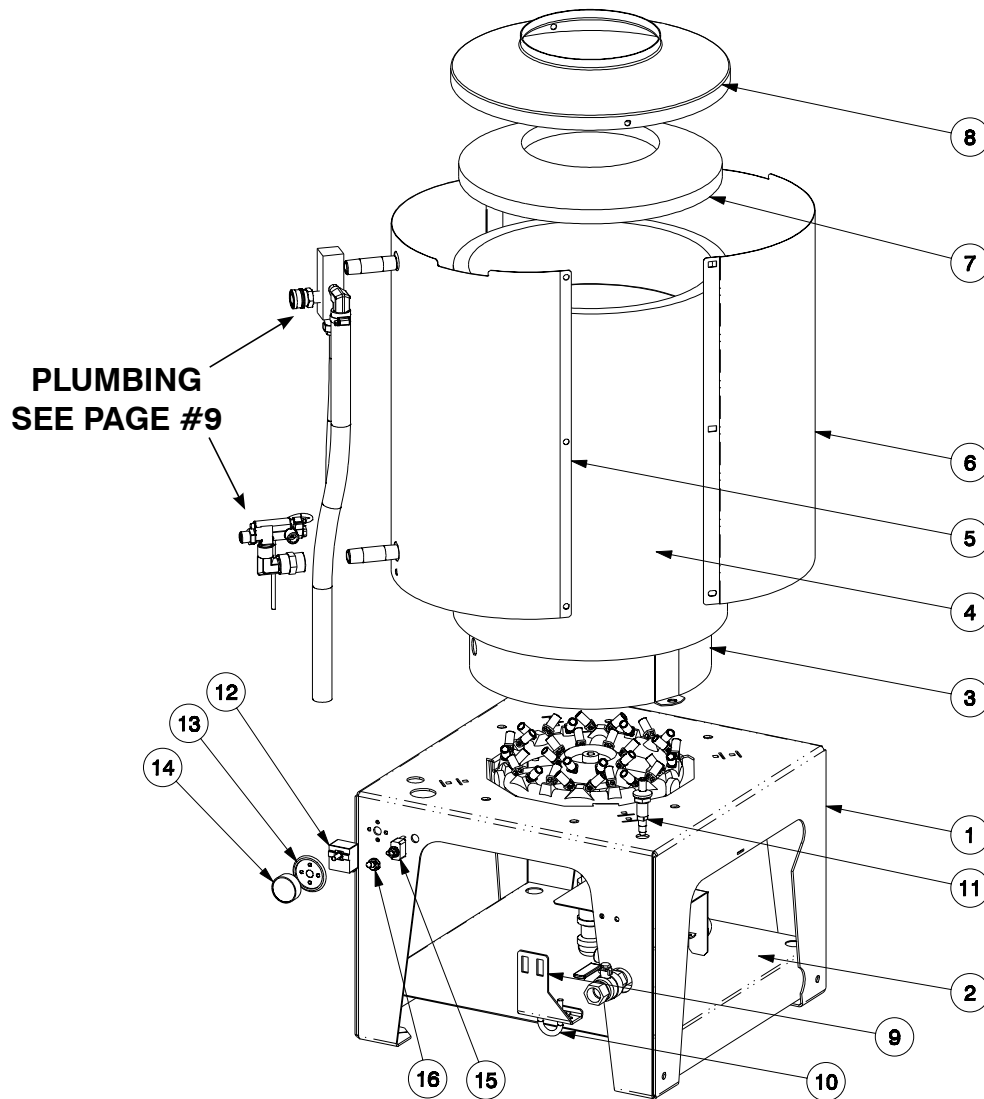
FAILURE TO MAINTAIN HEAT EXCHANGER COIL MAY RESULT IN A STEAM EXPLOSION WHICH MAY CAUSE SERIOUS INJURY OR DEATH.

HEAT EXCHANGER COIL MAINTENANCE

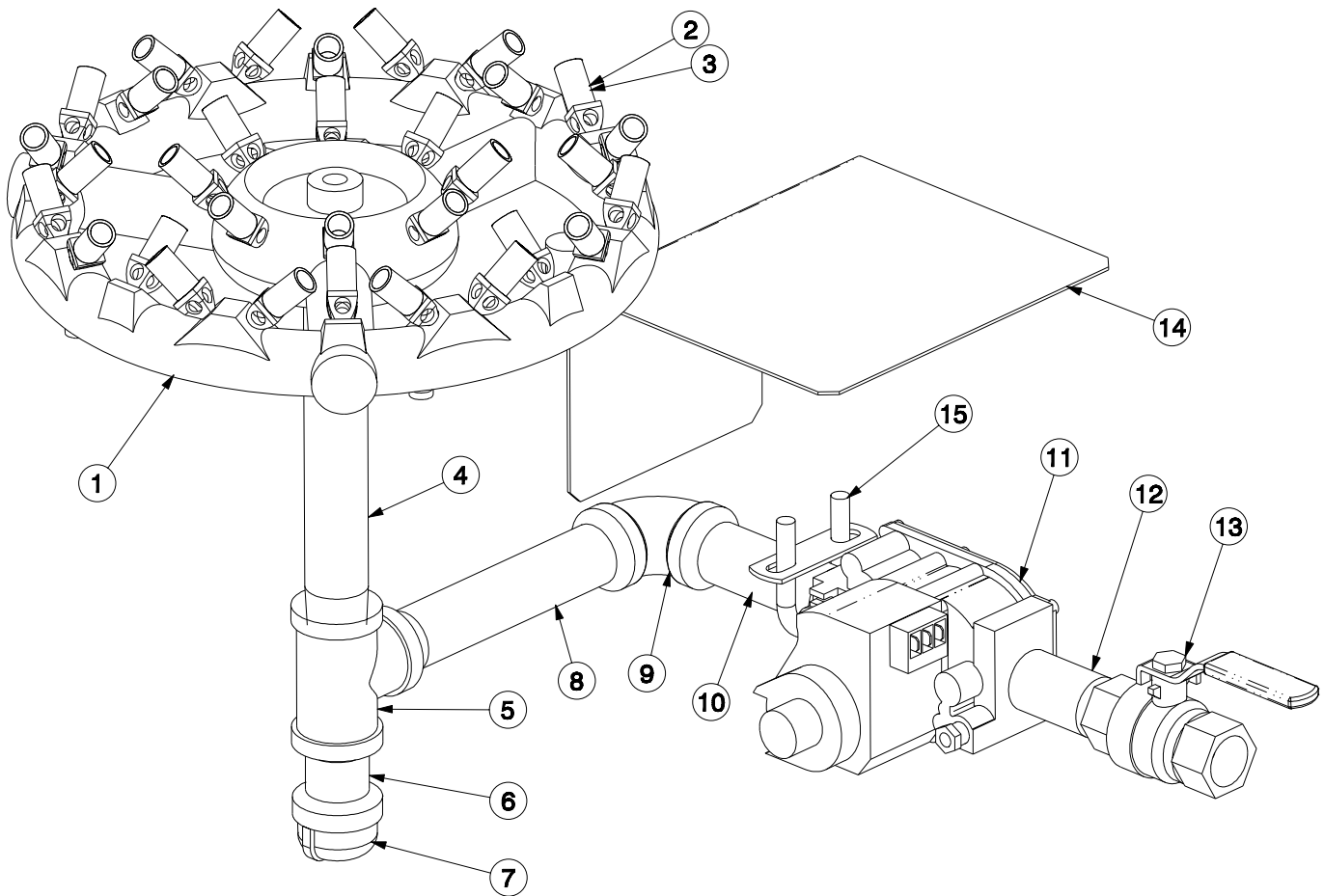
- Hard water conditions may eventually cause clogging in the heat exchanger coil if left unattended. Scale deposits will compromise the heating efficiency and produce an unsafe condition over time. It may be necessary to descale coil.
- Scale buildup from certain detergents may eventually clog up the heat exchanger coil causing an unsafe condition. Use only recommended detergents for better cleaning efficiency.
- Black carbon deposits that collect on the outside wall of the heat exchanger coil may be a result of using a poor grade of fuel or improper burner operation. Heating fuel should be void of water and sediments to eliminate the possibility of sooting and compromising the efficiency of the coil.

Troubleshooting

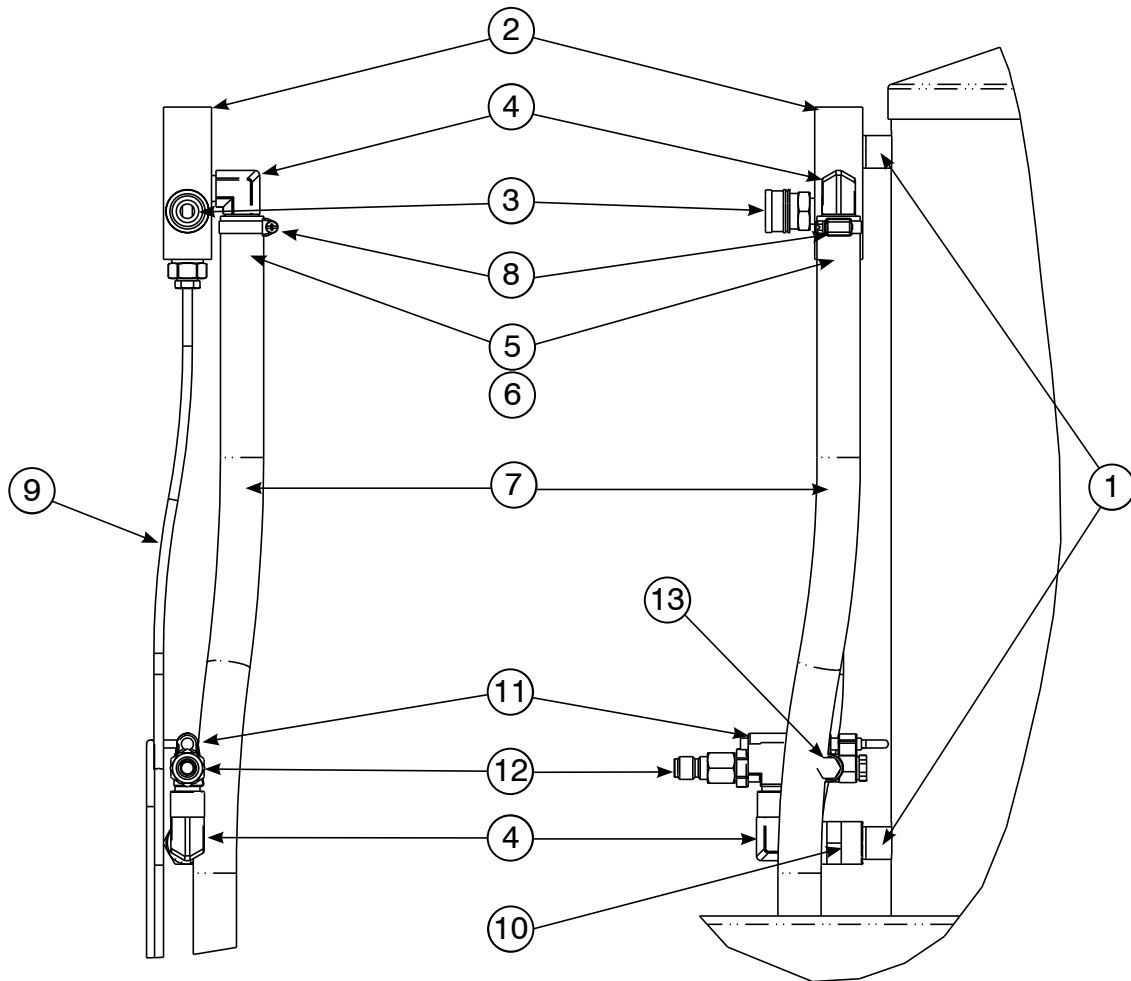
problem	cause	action
Burner Not Igniting	No fuel Burner switch turned off Thermostat set too low Defective flow switch High limit temp reached	Fill fuel tank with proper fuel Turn burner switch on Reset thermostat Replace pressure switch Cool down burner

**Exploded View and Parts List**

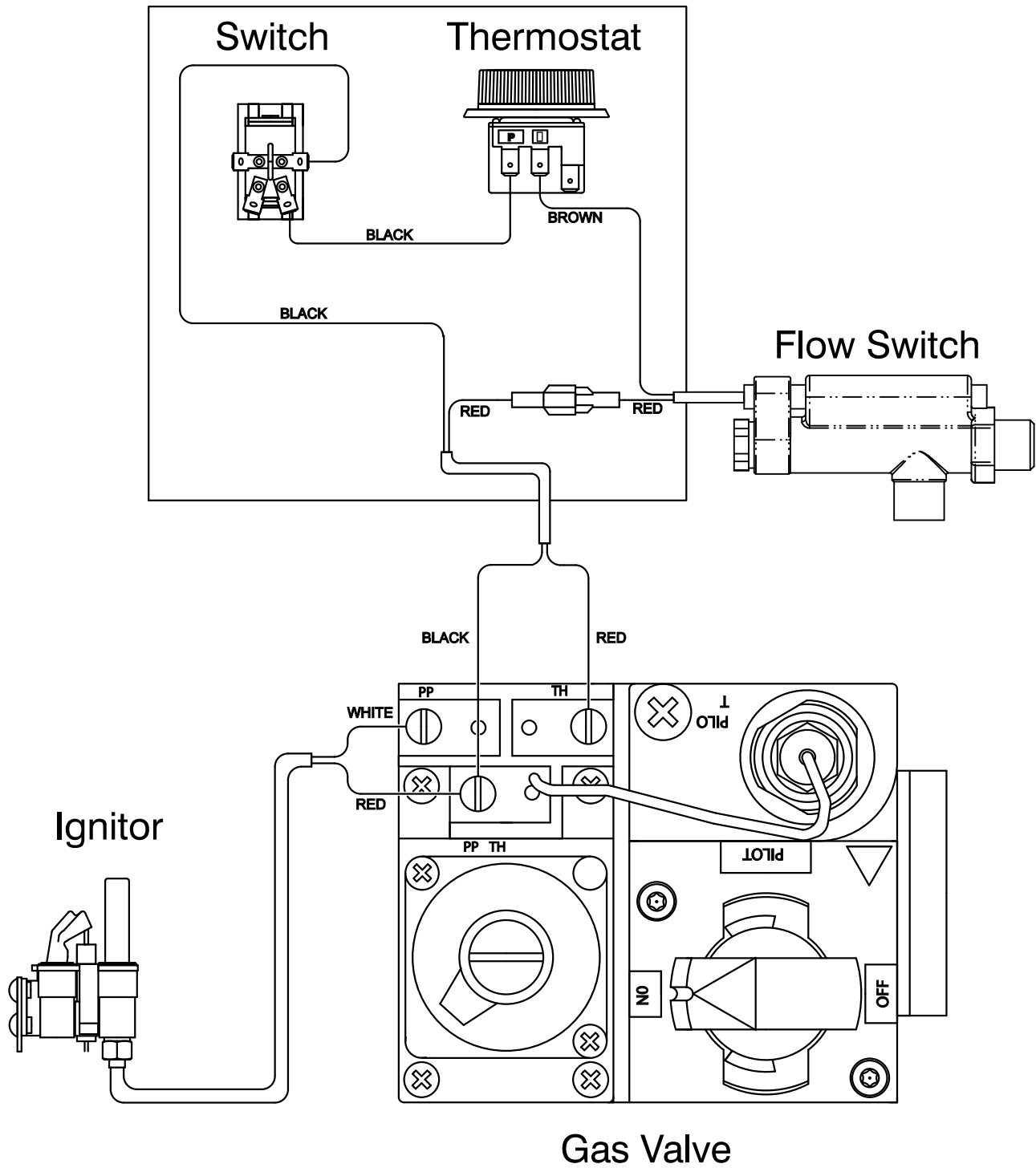
No.	Part Number	Description	Qty.
1	180-00379-02	Frame, VHB, NG/LP	1
2	180-00384-01	Ash Catcher, VHB, NG/LP	1
3	155-00002-02	Coil, medium, diesel fired	1
4	191-00006-01	Insulation, blanket, 1", 24" wide, x 49"L	1
5	180-00423-01	Shell, Stationary, 16" Round	1
6	180-00424-01	Shell, Removable, 16" Round	1
7	191-00009-01	Insulation cap, 16" x 8"	1
8	180-00425-01	Coil Cap, 16" x 8"	1
9	180-00209-01	Gas Pipe Bracket	1
10	504-00007-03	U-Bolt, 1" wide x 2 3/16" L x 5/16-18	1
11	569-00012-01	Ignitor, Piezo snap 1244-17	1
12	573-00001-01	Thermostat, 194 degree, 100438	1
13	N/A	Plate, Thermostat (part of 573-00001-01)	1
14	N/A	Knob, Thermostat (part of 573-00001-01)	1
15	450-00004-01	Switch, toggle, NKK#S301F	1
16	457-00001-01	Boot, switch, water proof, NKK#AT402	1

**Burner & Plumbing**

No.	Part Number	Description	Qty.
1	250-00011-02	Burner ring, #X11 w/ 640 jets	1
2	255-00001-03	Burner Spud, #52 (NG)	32
3	255-00001-04	Burner Spud, #62 (LP)	32
4	524-00007-05	Nipple, Black Pipe, 3/4" npt X 7.0"	32
5	536-00005-01	Tee, Black Pipe, Box, 3/4" nptf	1
6	524-00007-01	Nipple, Black Pipe, 3/4" npt x 2.0"	1
7	518-00008-01	Cap, Black Pipe, 3/4 nptf	1
8	524-00007-04	Nipple, Black Pipe, 3/4" npt X 6.0"	1
9	528-00010-01	Elbow, Black Pipe, 90 deg, 3/4 " nptf	1
10	524-00007-03	Nipple, Black Pipe, 3/4" npt X 4"	1
11	569-00021-01	Valve, Regulator, Robert Shaw #453501532	1
12	524-00007-02	Nipple, Black Pipe, 3/4" npt X 3"	1
13	569-00006-01	Valve, Gas Ball, 3/4" nptf X 3/4" nptf	1
14	180-00237-01	Heat Shield, Gas Valve	1
15	504-00007-03	U-Bolt, 1" wide x 2 3/16" L x 5/16-18	1

**Plumbing Diagram**

Ref.#	Part #	Description	Qty.
1	524-00013-02	Nipple, sch. 80, 1/2" x 3", gal	2
2	185-00001-01	Manifold, outlet	1
3	554-00006-03	QC coupler socket, brs, 3/8", nptm	1
4	528-00002-02	Elbow, street, sp, 3/8" nptm x 3/8" nptf, 90 degr	2
5	545-00002-01	Rupture valve body	1
6	545-00001-01	Rupture disc, 5000	1
7	285-00005-05	Tubing, hypalon, 7/8" ID, 1-1/8" OD	2 ft
8	557-00001-03	Hose clamp, ss, #12	1
9	573-00001-01	Thermostat, 194 degree, 100438	1
10	540-00004-01	Coupler, sp, 1/2" nptf x 3/8" nptf	1
11	574-00001-01	Flow switch, ST-6	1
12	552-00004-03	QC plug, sp, 3/8", nptf	1
13	518-00004-01	Plug, brs, 3/8" pipe	1

**Wiring Diagram**

Limited One Year **WARRANTY**

Ramteq Incorporated ("RAMTEQ") warrants that the Product you have purchased from RAMTEQ or from an Authorized RAMTEQ Reseller is free from defects in materials or workmanship under normal use for a period of one (1) year from the date of purchase. This warranty extends only to you, the original Purchaser. It is not transferable to anyone who subsequently purchases the Products from you. This warranty specifically excludes expendable items, including but not limited to hoses, seals, nozzles and gunjets. RAMTEQ manufacturers warrant certain components of the Products for periods greater than one (1) year. MOTORS, GENERATORS, PUMPS, COILS, BURNERS AND ENGINES ARE WARRANTED BY THEIR RESPECTIVE MANUFACTURERS, AND SERVICED THROUGH THESE MANUFACTURERS' LOCAL AUTHORIZED SERVICE CENTERS. Specific warranty details can be found on the individual manufacturers website. RAMTEQ CANNOT PROVIDE WARRANTY ON THESE ITEMS.

During the warranty period, RAMTEQ will repair or replace defective parts, at the option of RAMTEQ.

This limited warranty does not extend to any Product not purchased from RAMTEQ or from an Authorized RAMTEQ Reseller. This limited warranty also does not extend to any Product that has been damaged or rendered defective (a) as a result of accident, misuse or abuse; (b) by operation outside the specifications in the intended applications; (c) by the use of parts not sold or manufactured by RAMTEQ; (d) by the modification of the Product.

Warranty Disclaimer

EXCEPT AS EXPRESSLY SET FORTH IN THIS WARRANTY, RAMTEQ MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. RAMTEQ EXPRESSLY DISCLAIMS ALL AND ANY WARRANTIES NOT STATED IN THIS LIMITED WARRANTY. ANY IMPLIED WARRANTIES THAT MAY HAVE BEEN IMPOSED BY LAW ARE LIMITED TO THE TERMS OF THIS EXPRESS LIMITED WARRANTY.

Limitation of Remedy

RAMTEQ IS NOT LIABLE FOR ANY DAMAGES CAUSED BY THE PRODUCT OR FAILURE OF THE PRODUCT TO PERFORM, INCLUDING INCIDENTAL AND CONSEQUENTIAL DAMAGES. THIS LIMITATION APPLIES WHETHER DAMAGES ARE SOUGHT, OR A CLAIM MADE, AS A CONTRACT CLAIM, AS A TORT CLAIM, OR ANY OTHER CLAIM.

THIS LIMITATION OF LIABILITY, HOWEVER, WILL NOT APPLY FOR PERSONAL INJURY.

U.S.A. State Laws

Some states do not allow limitation on how long an implied warranty lasts. In such states, the limitations or exclusions of this Limited Warranty may not apply to you.

Some states do not allow the exclusion or limitation in incidental or consequential damages for consumer products. In such states, the exclusion may not apply to you. This limited warranty gives you specific legal rights. You may also have other rights that may vary from state to state. You are advised to consult applicable state laws for a full determination of your rights.

How to Obtain Warranty Service

TO OBTAIN WARRANTY SERVICE YOU MUST CONTACT RAMTEQ or an AUTHORIZED RAMTEQ RESELLER.



Manufacturers Warranty Period

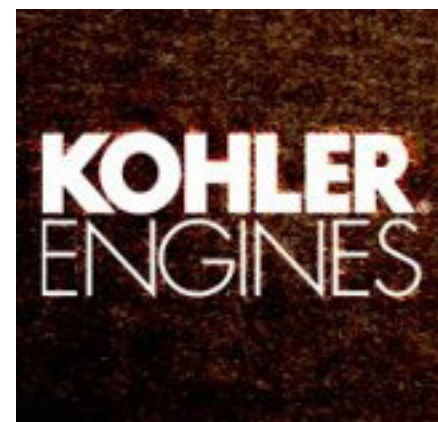
Click on pictures to open manufacturers website.



5 years



5 years



3 years



3 years



3 years



18 months

M&M Manufacturing Co. Inc.

3 years



18/36 months



1 year